Water Stewardship as a Driver of Resilient Industrial Growth

PORTO DO AÇU

BUILDING POSITIVE IMPACT BEYOND PORT BOUNDARIES

Water Security and the Future of Industrial Ports

Addressing climate resilience and enabling the low-carbon transition are among the defining sustainability challenges of this century. As climate change intensifies droughts, floods, and water-related disruptions, pressure on shared freshwater systems continues to grow. At the same time, the expansion of low-carbon industries – including green hydrogen, e-fuels, and green steel – is expected to significantly increase industrial water demand, making water security an increasingly strategic issue for industrial development.

In this context, ports play a singular role. As clusters connecting industry, energy, logistics, and maritime activities, they increasingly concentrate water-intensive operations within shared freshwater systems. Their ability to sustain future growth depends not only on infrastructure and connectivity, but also on the resilience of the natural systems that support industrial development and surrounding communities.

For industrial ports, water resilience is becoming a strategic condition for long-term competitiveness.

OUR MISSION

Developing a competitive port-industry

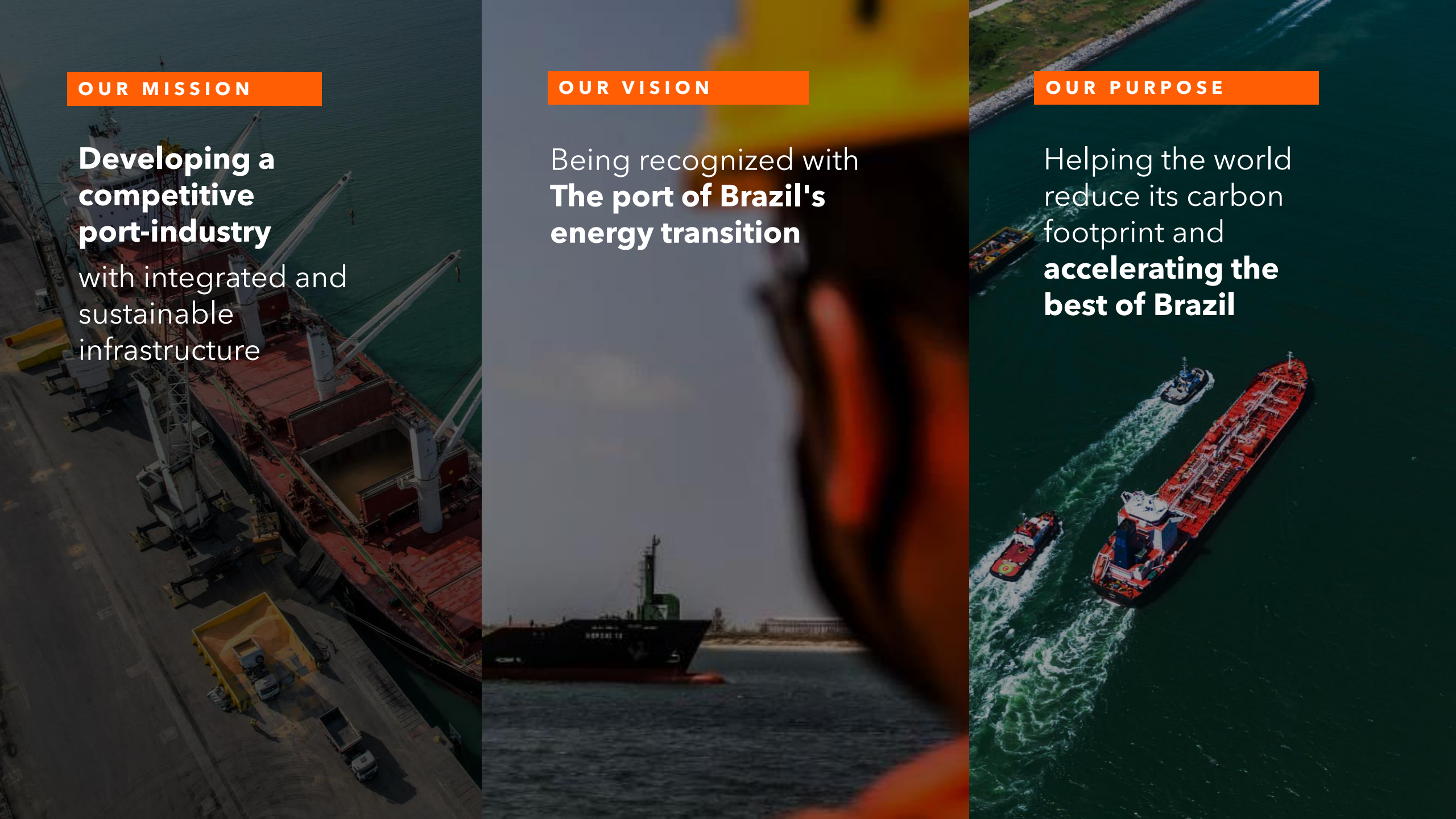
with integrated and sustainable infrastructure

OUR VISION

Being recognized with **The port of Brazil's energy transition**

OUR PURPOSE

Helping the world reduce its carbon footprint and **accelerating the best of Brazil**



The port's future industrialization will be based on sustainable business

HYDROGEN
INPUT FOR LOW-CARBON INDUSTRIALIZATION

HBI
STARTING POINT FOR DECARBONIZING THE STEEL INDUSTRY

BIOMASS
CARBON-NEUTRAL ENERGY SOURCE

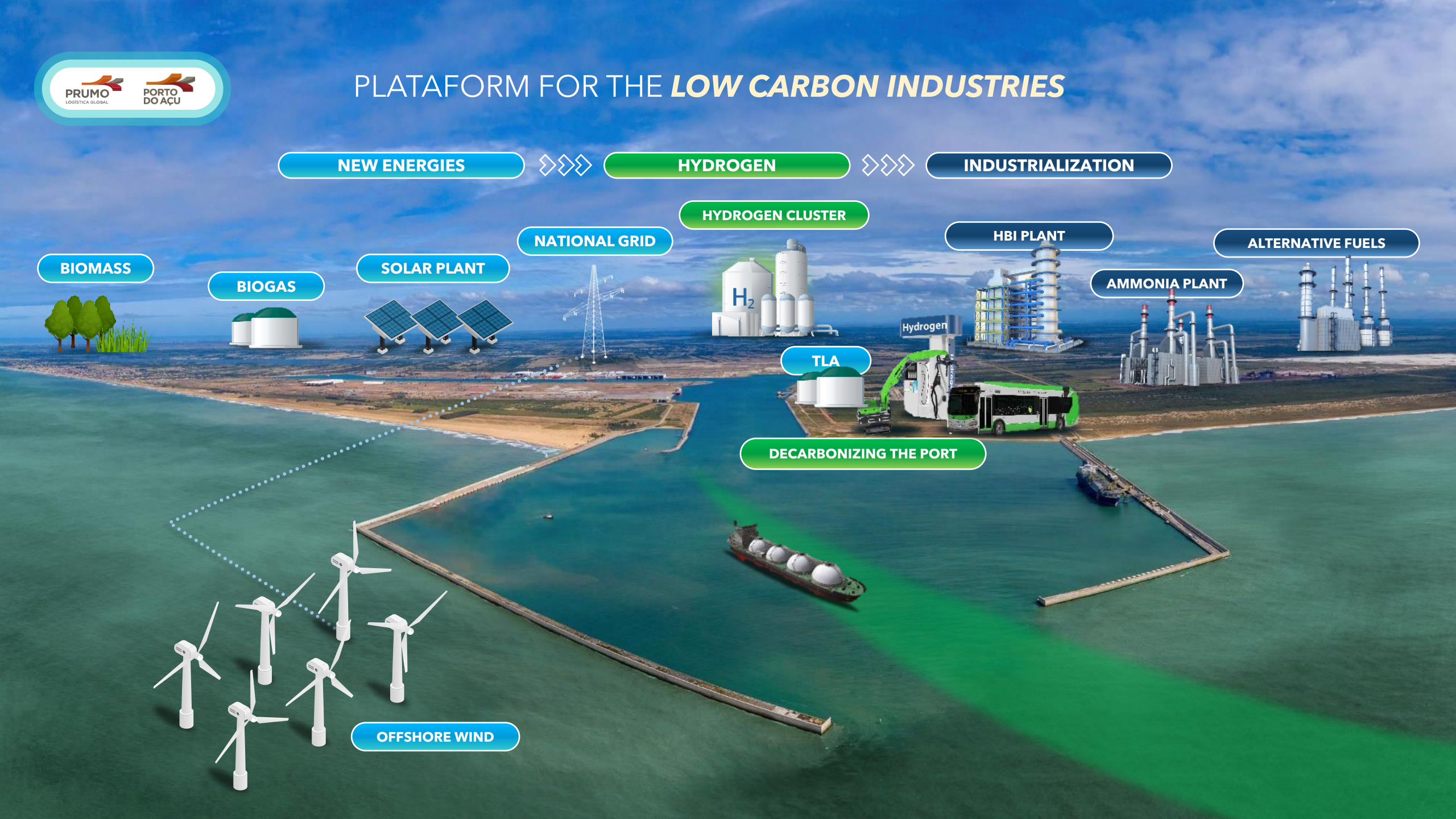
RENEWABLES
RENEWABLE ENERGY AVAILABLE FOR CONSUMPTION BY THE NEW INDUSTRIES IN AÇU

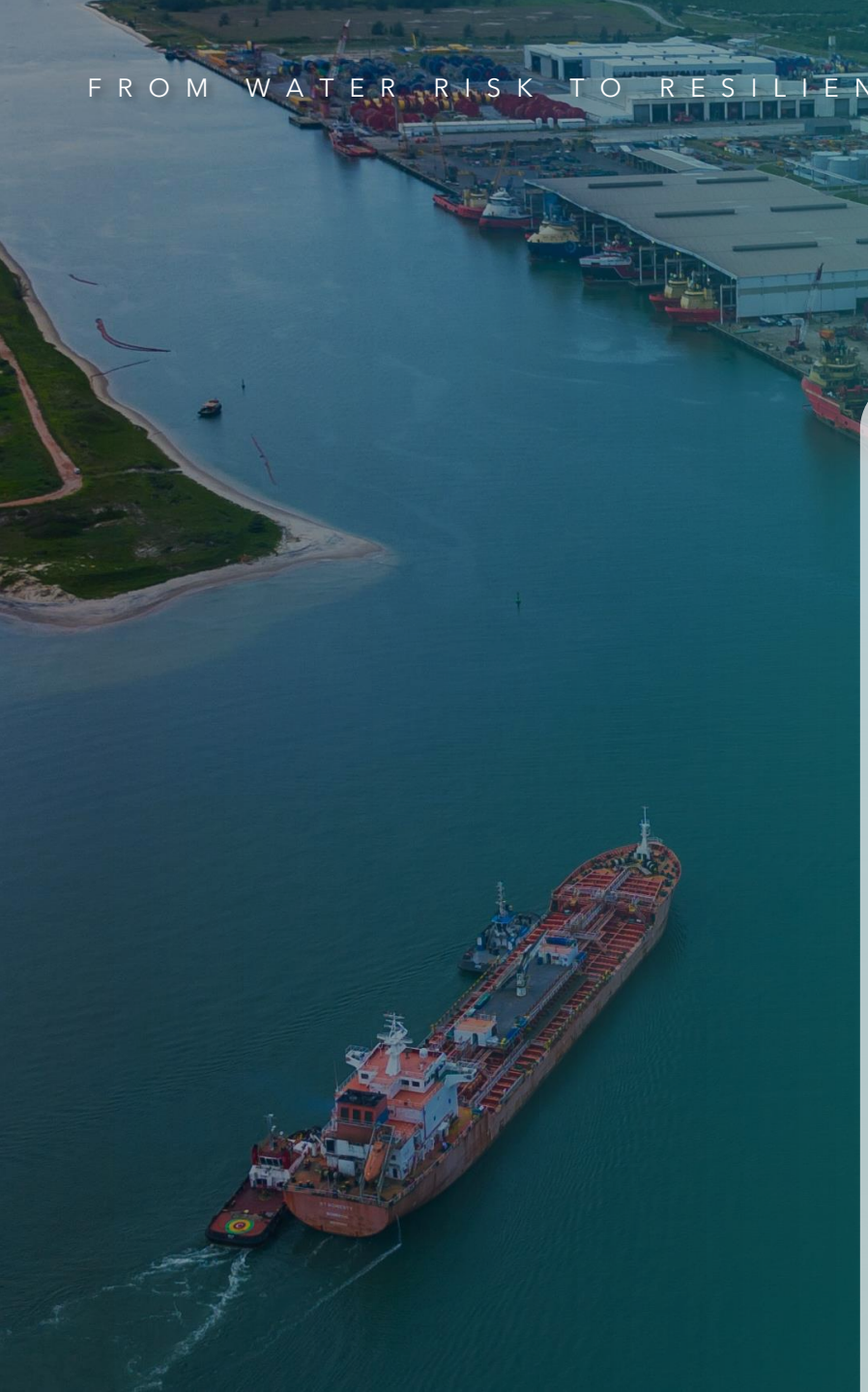
PRUMO LOGÍSTICA GLOBAL

PORTO DO AÇU

PLATAFORM FOR THE ***LOW CARBON INDUSTRIES***

NEW ENERGIES >>> **HYDROGEN** >>> **INDUSTRIALIZATION**





Port of Açu's Strategic Driver

Port of Açu is uniquely positioned to become a leading ecosystem for low-carbon industries in Brazil. Its industrial clustering model, world-class infrastructure, and strategic location create favorable conditions for the development of sectors such as green hydrogen, e-fuels, and green steel.

Since the beginning of its operations, water security has been a strategic condition for Port of Açu's industrial and port development. As industrial growth accelerated, and new industries became part of the port's long-term vision, water security became increasingly linked to operational continuity, social license to operate, and long-term competitiveness.

Recognizing water as a potential constraint to future growth, Port of Açu embedded water stewardship into its 2050 Ambition, continuously evolving its water management approach to support new demand scenarios.

To support this transition, the port developed an integrated approach combining long-term water planning, diversified supply systems, industrial water circularity, ecosystem restoration, and replenishment initiatives. This reduces freshwater dependency while strengthening resilience across the local watershed.

AMBITION 2050

CONTRIBUTE TO A POSITIVE FUTURE FOR NATURE AND PEOPLE

BEING AN AGENT OF **SOCIAL TRANSFORMATION AND ECONOMIC DEVELOPMENT**

1 **Promoting a safe, inclusive and welcoming work environment that fosters personal and professional development**

2 **Contribute to sustainable regional development and the progressive improvement of social and local indicators**

PROMOTING A **POSITIVE ECONOMY FOR NATURE**

3 **Promote the conservation of coastal ecosystems and generate a positive impact on biodiversity**

4 **Develop climate-resilient operations and achieve zero net greenhouse gas emissions**

OUR PRINCIPLES AND TOOLS FOR SUCCESS

- Security
- Ethics
- Rel. Gov.
- Innovation

GUIDED BY ITS 2050 AMBITION

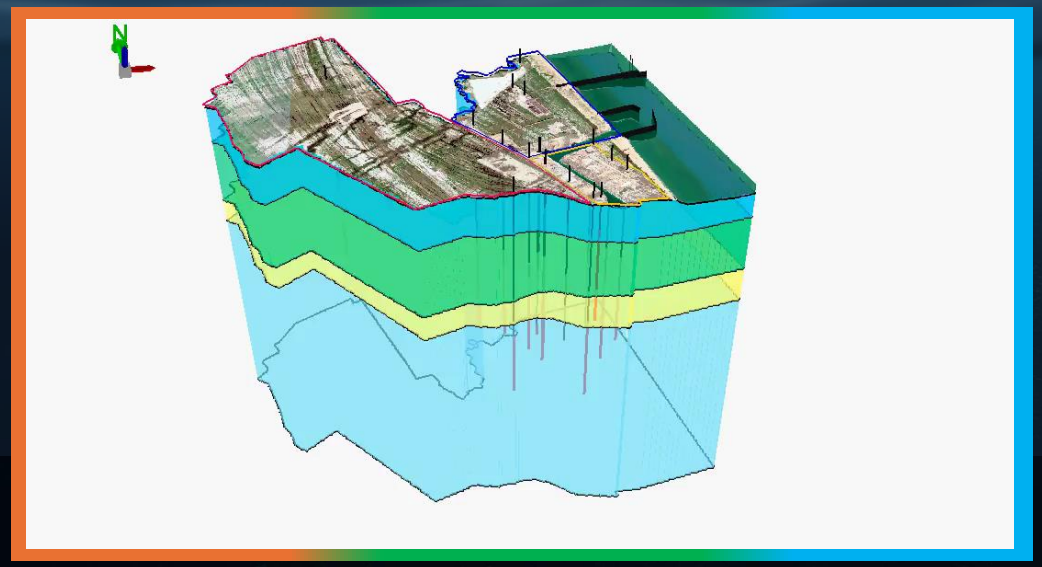
Transforming Water Management into a Strategic Driver

Port of Açu's water stewardship strategy is currently guided by its 2050 Ambition, which positions sustainability as a foundation for industrial competitiveness. Based on long-standing approach on water security to support industrial and port development, the port projects foresee water demand decades ahead and designs a diversified portfolio of supply sources – seawater intake, industrial reuse, rainwater harvesting, and groundwater – to support future industrial needs and strengthen long-term resilience.

Equally distinctive is the integration of circular water loops across industries in the cluster. Effluents from the iron ore slurry pipeline are treated and reused, while seawater cooling at the gas-fired complex reduces reliance on freshwater. Together, these synergies stablish a local circular economy that is unprecedented in Latin America. Supported by a source-to-user monitoring system, this approach proves how water stewardship can evolve from a constraint into a catalyst for resilient growth.

Master Plan for Water Supply

A long-term water strategy enabling industrial growth, operational resilience, and the low-carbon transition



Long-term planning

A long-term plan designed to support Porto do Açu's growth through the rational and sustainable management of water resources across the watershed.

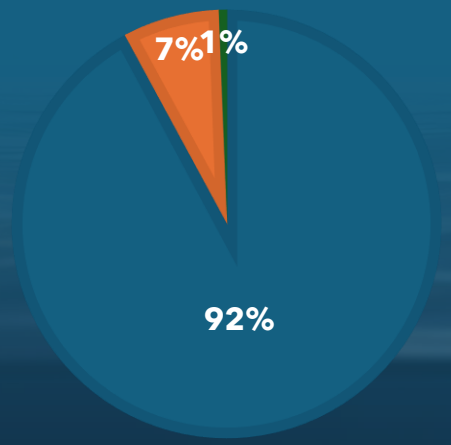
Diversified water supply

A diversified water supply portfolio designed to meet current and future demand from Porto do Açu with security, efficiency, and resilience.

Conjunctive water use

Conjunctive water use – coordinated use of groundwater, surface, seawater, water reuse and rainwater harvesting – reducing freshwater dependency and supporting a resilient industrial future.

Long-Term Planning for the Resilient Development of Porto do Açu

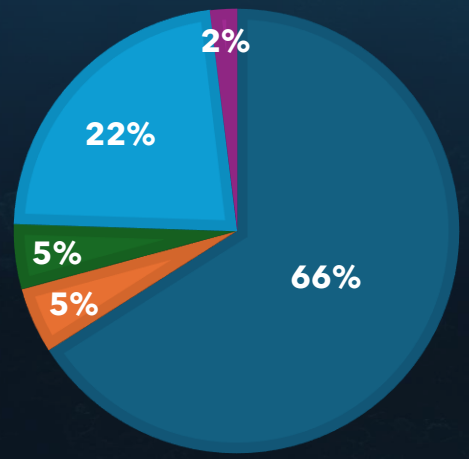


2025

- Seawater
- Groundwater
- Reuse and Rainwater

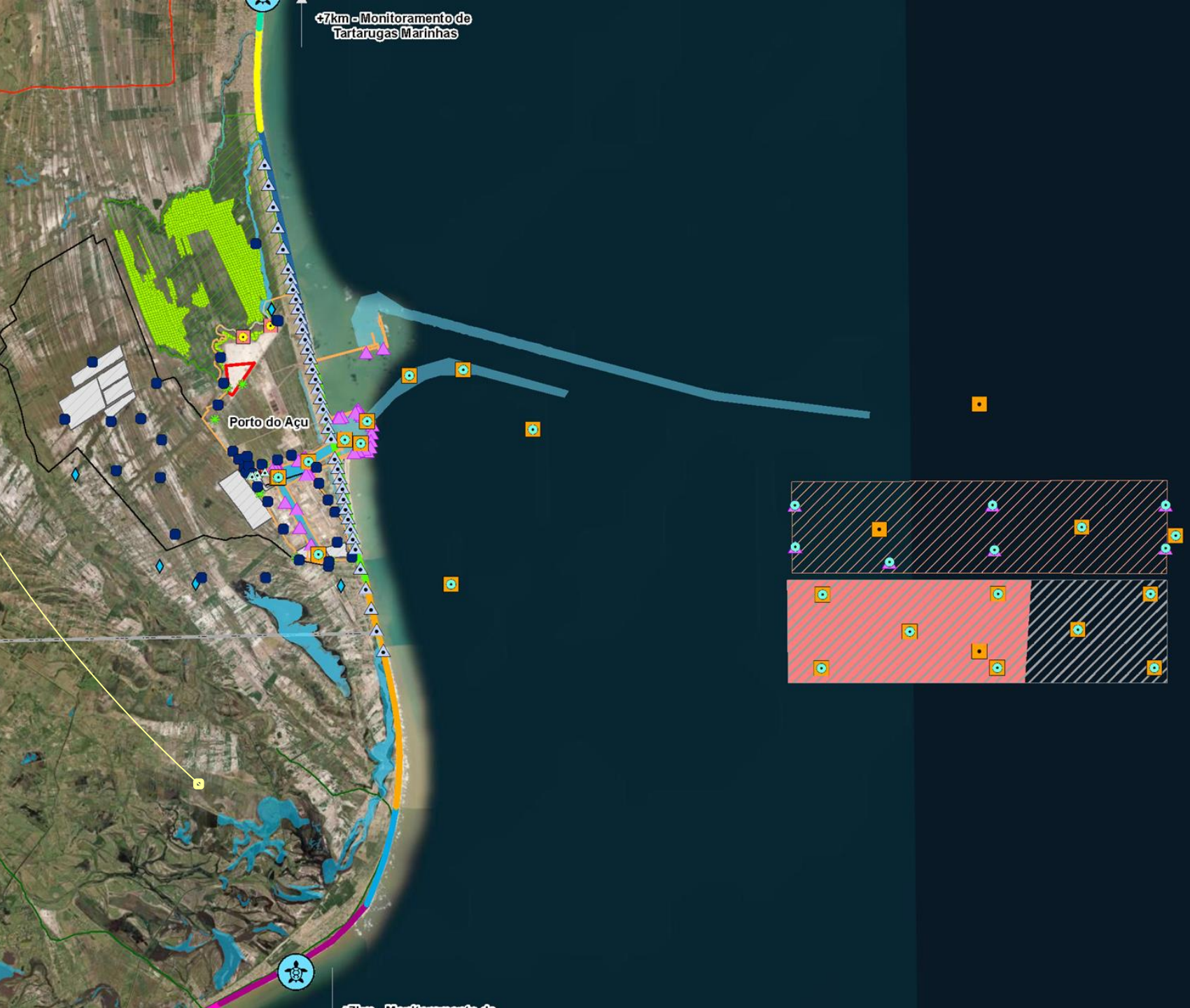
2050+

- Seawater
- Seawater desalination
- Groundwater
- Surface water
- Reuse and Rainwater



The sustainable and resilient development of Porto do Açu is guided by an integrated water management strategy, based on the following principles:

- **Predominant use of seawater:** Prioritizes the use of seawater in industrial cooling processes, reducing pressure on freshwater sources.
- **Strategic desalination:** Implements seawater desalination systems as a measure to preserve underground aquifers and reducing the need for surface water intake.
- **Investment forecast:** Ensures coordinated planning and execution of water infrastructure, providing predictability and efficiency in long-term investments.
- **Reduction of freshwater dependency:** Minimizes the use of freshwater resources in high demanded public supply.
- **Technical evaluation and continuous monitoring:** Establishes robust mechanisms for environmental assessment and monitoring, ensuring that water use remains sustainable, without negative impacts on local watershed and mitigating conflicts with stakeholders.



ENVIRONMENTAL MONITORING

Coastal Lagoon Monitoring

2 monitoring stations for water quality, sediments, and biota

Groundwater Monitoring

52 water quality monitoring wells (physical, chemical, and biological parameters)

Marine Monitoring

22 monitoring stations for water, sediments, and biota

6 bioindicator monitoring stations

Deep Well Monitoring

11 water quality monitoring wells (hydrogeochemical monitoring and telemetry)

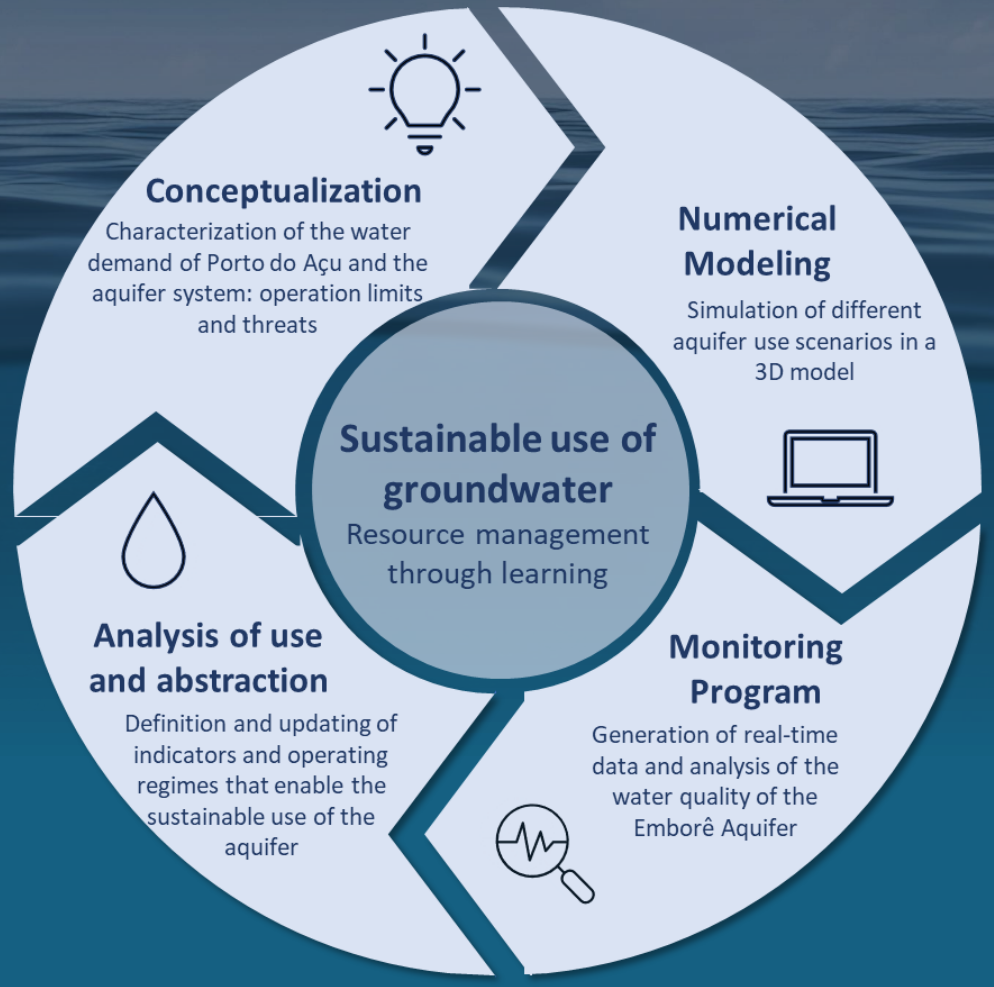
Groundwater adaptative management

Groundwater is currently the main freshwater source of supply for the Port of Açu. The challenges of ensuring its sustainable use led to the creation of a robust monitoring and control system, inspired by global best practices, and considered pioneering in Brazil.

Adaptive management of the aquifer is built on three key pillars:

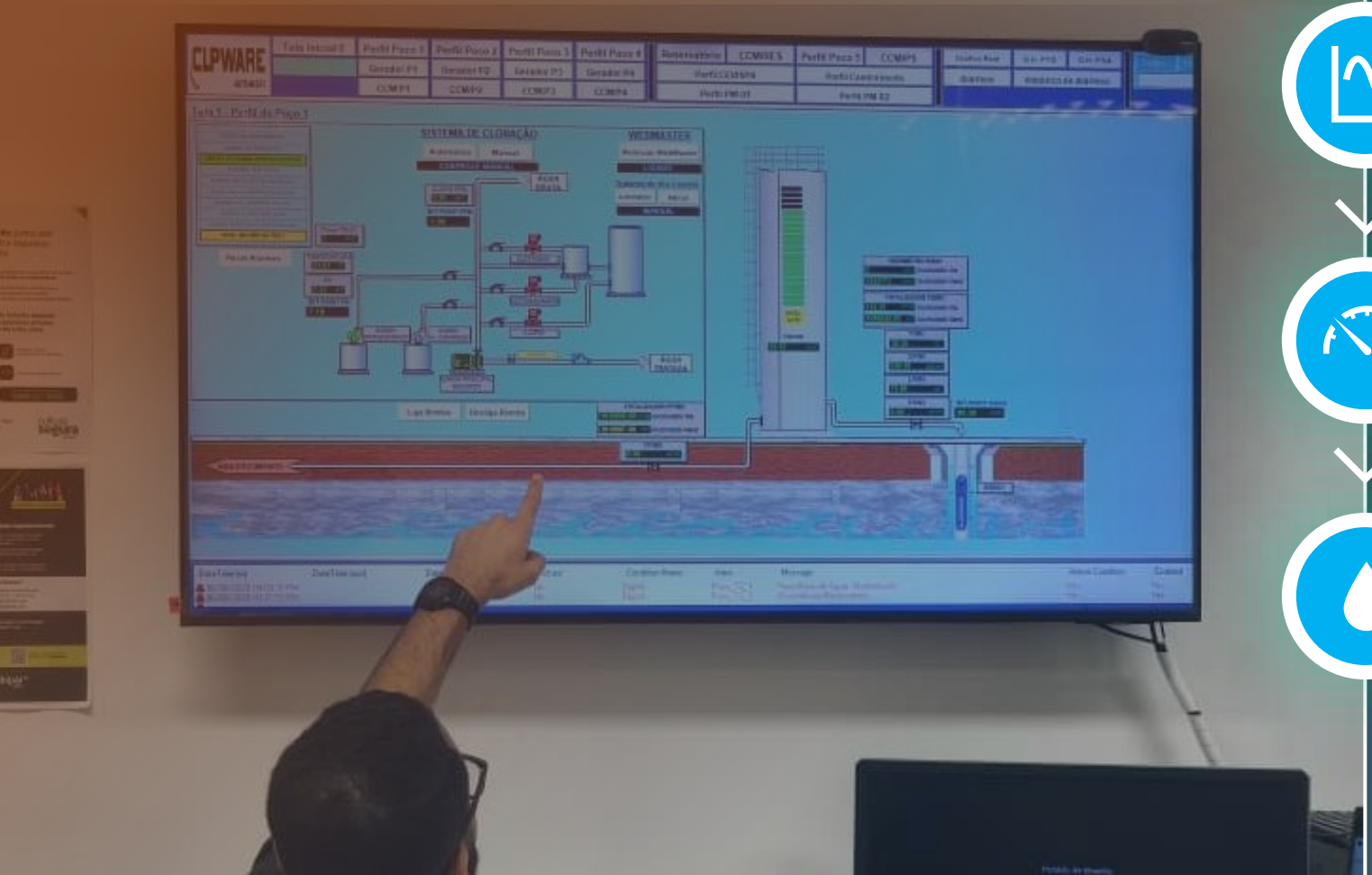
- Hydrogeological knowledge of the processes that govern the system;
- A continuous and modern monitoring program, capable of tracking groundwater dynamics in real time;
- Advanced numerical modeling, used as a planning tool for water abstraction.

These measures are complemented by operational control of the wells, guided by the knowledge built throughout the process. Together, they enable strategic decision-making for both present and future use, ensuring the long-term sustainability of the aquifer, mitigating water quality impacts.



Groundwater monitoring system

Real-time monitoring to provide quality control in well operation, ensuring long-term sustainable use of groundwater without negative impacts on the subsurface environment.



Real time monitoring

Real-time monitoring of operational parameters of the wells (flow rate, volume extracted and operating time) and parameters of the aquifer (water level and electrical conductivity).

Piezometric monitoring

Piezometric monitoring makes it possible to identify and manage interference between wells, helping to prevent aquifer depletion and promoting the sustainable use of groundwater with stronger indicators of conservation and management.

Electrical conductive monitoring

Electrical conductivity is a simple and efficient parameter for monitoring water salinity. This monitoring provides a water quality indicator for controlling saline intrusion in coastal aquifers.

Groundwater sustainable use

Hydrogeochemical and isotopic analyses complement the groundwater monitoring program. Monitoring demonstrates the stability of parameters and indicates the groundwater sustainable use.

Leadership embedded in long-term governance

Since the early development of Port of Açu, leadership recognized water security as a strategic condition for industrial and port growth. As industrial activity accelerated and water-intensive sectors became part of Port of Açu's future, governance structures evolved to predict rising demand, manage basin-level risks, and support long-term development.

This leadership approach integrates water considerations into decisions on infrastructure, industrial expansion, and risk management, ensuring that growth stays aligned with operational continuity and regional resilience.

Port of Açu acts as a convener, coordinating tenants, industries, and local authorities to build shared solutions. By integrating water risk assessments into planning and fostering collaboration across the local watershed, the port proves how governance can extend beyond operational boundaries to strengthen regional resilience.

This leadership transforms sustainability from aspiration into practice, positioning Port of Açu as a trusted steward of both industrial growth and natural resources.

Structured Water Stewardship Journey

Port of Açu deployed a science-based and measurable water stewardship strategy through a structured four-step approach:

Risk Assessment

Identification of basin-level water risks, including scarcity, flooding, water quality and infrastructure resilience

Water Balance

Assessment of water consumption across the port-industrial cluster to establish a clear operational baseline

Targets & Action Plan

Translation of findings into practical actions focused on water resilience, circularity, replenishment and reduced freshwater dependency

Communication & Transparency

Integration of water stewardship into sustainability reporting, monitoring and stakeholder engagement

Promoting the UN Sustainable Development Goals

By embedding water resilience into industrial development, Port of Açu generates measurable environmental and social value aligned with multiple UN Sustainable Development Goals. Through reduced freshwater dependency, industrial circularity and ecosystem restoration, the port contributes directly to SDG 6 (Clean Water and Sanitation) and SDG 12 (Responsible Consumption and Production). Its role in enabling low-carbon industries and resilient infrastructure also supports SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).

Port of Açu further advances SDG 9 (Industry, Innovation, and Infrastructure) by integrating circular water systems and long-term planning into industrial growth. Through the protection of the Caruara Reserve, the port contributes to SDG 14 (Life below Water) and SDG 15 (Life on Land), helping preserve coastal ecosystems, biodiversity and strengthen watershed resilience. Finally, collaboration with tenants, communities, public authorities, and technical partners reinforces SDG 17 (Partnerships for the Goals), ensuring that industrial development creates shared value for both people and ecosystems.

Building solutions through collective action

Water security cannot be achieved by a single actor. In a shared watershed, industrial activity, ecosystem health, and community well-being are interconnected – requiring coordination beyond port boundaries.

At Port of Açu, this translates into collaboration with industries, public authorities, local communities, and technical partners across the local watershed.

The Caruara Reserve plays a significant role in this approach. Beyond strengthening ecosystem and water resilience, it supports relationships with local stakeholders through biodiversity conservation, scientific research, environmental education, and community engagement – reinforcing trust and long-term dialogue.

Within the industrial cluster, partnerships with tenants enable industrial symbiosis, where water and resources are reused across facilities, reducing freshwater dependency and strengthening circularity.

This cooperative model proves that long-term water stewardship depends on shared responsibility, aligning industrial activity with ecosystem protection and regional sustainability.

RESERVA CARUARA

BRAZIL'S LARGEST PRIVATE RESTINGA RESERVE

Safeguarding water resources, biodiversity and ecosystem resilience

40km²
PROTECTED RESTINGA ECOSYSTEM

+20
ENVIRONMENTAL MONITORING PROGRAMS PROTECTING WATER AND BIODIVERSITY

+500
SPECIES SUPPORTING ECOSYSTEM RESILIENCE

+2.4
MILLION M³ OF WATER REPLENISHED TO THE BASIN IN 2024

VISITOR CENTER

SEA TURTLE MONITORING PROGRAM

SEEDLING NURSERY

The project already delivers measurable and verifiable outcomes

A long-term approach to water management is already translating into tangible results. By combining alternative water sources, industrial reuse and ecosystem-based solutions, Port of Açu is reducing pressure on freshwater resources while supporting sustainable industrial development.

Supported by monitoring systems, governance and stakeholder engagement, these efforts are generating measurable environmental and operational benefits.

Alternative Water Sources

~90% of industrial water balance supplied through seawater + reused industrial water

Water Positive Status (2024)

- Freshwater withdrawals: **1.75 million m³/year**
- Net Positive Balance: **+980,000 m³/year**
- Replenishment benefits: **2.73 million m³/year**
- Replenishment ratio: **155%**

A model for resilient and sustainable ports

Port of Açu demonstrates how ports can turn **responsible water management into a driver of sustainable industrial development**. Through long-term planning, circular solutions, alternative water sources, ecosystem conservation and collaborative action, the port is strengthening water security while creating measurable positive impact beyond its boundaries.

> ***"Growing industry while replenishing water: a scalable model for resilient and sustainable ports."***
>
> **PORTO DO AÇU**

Key Pillars of Success

2050 Ambition
Water stewardship as a strategic priority

Water Positive
155% replenishment ratio, +980,000 m³/year

Collaborative Governance
Shared solutions across the local watershed

Industrial Circularity
90% of water from seawater + reuse loops

Ecosystem Restoration
Caruara Reserve protecting biodiversity and water resources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